THE CLAIMS:

1. In combination with an objective lens assembly disposed coaxially of the optical axis of an inspection device for projecting thereto an image of the illuminated surface of a workpiece spaced beneath and in registry with said assembly, a variable incidence oblique illuminator, comprising

a housing secured to and surrounding said assembly,

illuminating means in said housing for directing an expanding cone of illumination toward said workpiece coaxially of said optical axis,

a focusing element positioned between said housing and said workpiece in the path of said cone coaxially thereof, and operative to redirect and focus said cone of illumination onto the surface of said workpiece at a predetermined angle of incidence relative to said optical axis, and

means mounting said focusing element for limited movement longitudinally of said axis between said housing and said workpiece, said element being operative to decrease said angle of incidence upon approaching said housing, and to increase said angle of incidence upon approaching said workpiece.

2. The combination as defined in claim 1, wherein said mounting means includes means for moving said element into different positions of rest between a first limit position in which said angle of incidence amounts to 15°, to a second limit position in which said angle of incidence amounts to 75°.

3. The combination as defined in claim 2, wherein said focusing element is a Fresnel lens.

4. The combination as defined in claim 1, wherein said illuminating means comprises

an annular array of narrow-beam light sources mounted in said housing coaxially of said axis and operative to direct an array of light beams radially toward said axis, and

a like annular array of mirrors mounted in said housing coaxially and radially inwardly of said light sources to register with the beams therefrom,

said mirrors being inclined to said axis and being operative to direct said light beams as said expanding cone of illumination onto said focusing element at a predetermined angle of incidence relative to said optical axis.

5. The combination as defined in claim 4 wherein said light sources comprise a plurality of light emitting diodes having collimating lenses secured over the light emitting ends thereof.

6. The combination as defined in claim 3, wherein said Fresnel lens comprises

a pair of similar, disc-shaped Fresnel lens elements having therethrough registering central openings disposed coaxially of said optical axis,

each of said lens elements having a plurality of radially spaced circular, light refracting facets formed on one surface thereof, and

means securing said elements together with the faceted surfaces thereof disposed in confronting, coaxial relation to each other.

7. The combination as defined in claim 2, wherein said illuminating means is operative for each of said different positions of said focusing element to direct said expanding cone of illumination onto said element at the same angle of incidence relative to said optical axis.

8. The combination as defined in claim 7, wherein said same angle of incidence is 42 1/2°.

9. The combination as defined in claim 1, wherein

said focusing element comprises a disc-shaped Fresnel lens having therein a central opening registering coaxially with said lens assembly, and being movable between a first limit position adjacent said housing, and a second limit position adjacent said workpiece, and

said illuminating means being operative to direct said cone of illumination onto said Fresnel lens at a fixed angle of incidence relative to said optical axis for all different positions of said lens.

10. The combination as defined in claim 9, wherein said illuminating means comprises,

a circular array of light emitting diodes disposed coaxialy in said housing and operable to direct light beams radially toward said optical axis, and

a like array of mirrors interposed in the path of said beams between said diodes and said axis and operative to direct said beams in the form of said expanding cone of illumination onto said Fresnel lens at an angle of incidence relative to said optical axis which is the same for all said positions of said lens.

5